4-13-05

TF(2)5

Express Mail Receipt No. ED639816547US
Deposited on April 12, 2005

PATENT
Dkt. STL11420

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: **Clark E. Lubbers and Randy L. Roberson**
Assignee: **SEAGATE TECHNOLOGY LLC**
Application No.: **10/817,264** Group No.: **2114**
Filed: **April 2, 2004** Examiner: **Unknown**
For: **STORAGE MEDIA DATA STRUCTURE SYSTEM AND METHOD**

Mail Stop Petition
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PETITION TO MAKE SPECIAL FOR NEW APPLICATION UNDER M.P.E.P. § 708.02, VIII

1. Petition

Applicant hereby petitions to make this new application, which has not received any examination by the Examiner, special.

2. Claims

All the claims in this case are directed to a single invention. If the Office determines that all the claims presented are not obviously directed to a single invention, then applicant will make an election without traverse as a prerequisite to the grant of special status.

3. Search

A search has been made by professional searcher in the following:

Field of search: Graphics
Class/Subclass:
345/571

Computers
Class/Subclass:
130.00[illegible]/223

Memory
Class/Subclass:
711/114, 170

Faults
Class/Subclass:
714/6, 8 and 759

A copy of the search report from Mark Spector, professional searcher, is submitted herewith.

4. Copy of references

All of the references most closely related to the subject matter encompassed by the claims are listed in the Information Disclosure Statement which accompanies this Petition, in accordance with M.P.E.P. 708.02VIII(D).

Also included with the Information Disclosure Statement is Form PTO/SB/08A (substitute for form PTO-1449) and copies of the references listed therein.

5. Detailed discussion of the references

There is submitted herewith a detailed discussion of the references, which discussion particularly points out how the claimed subject matter is distinguishable over the references.

Also attached is an Information Disclosure Statement.

6. Fee

The fee required by 37 C.F.R. 1.17(i) is to be paid by:
Attached is a check in the amount of $130.00.
Charge any additional fees required by this paper or credit any overpayment to the Deposit Account No. 06-0540. A duplicate of this paper is attached..

7. Other Enclosures

Power of Attorney and Transmittal Letter
Preliminary Amendment and Transmittal
An acknowledgment postcard

Respectfully submitted,

Date: 4/12/2005

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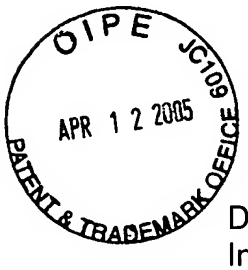

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RE: STORAGE MEDIA DATA STRUCTURE SYSTEM AND METHOD
STL11420

Dear Mr. McCarthy: 11.07.04

In response to your letter of 10.06, a patent search has been conducted regarding the 26 claims of STL11420 and in particular for a data storage method and system, using a grid of rows and columns with arrays of data storage blocks and domains, employing metadata descriptors with an array pointer, sparing tables of storage domains with spare data blocks, and data parity maps. User data is stored exclusively in a first portion of the grid and parity data can be stored in a second portion of the grid, providing optimized performance.

A search in US Patents was conducted in
Graphics, Class 345, Subclass: 571
Computers, Class 709, Subclass: 223
Memory, Class 711, Subclasses: 114, 170
Faults, Class 714, Subclasses: 6, 8 and 759

US Primary Patent Examiner D. Robertson au2186 was consulted.

The following 18 US Patents disclose grids, columns & rows, metadata descriptors, parity maps, spare processes...for optimized data storage.

6775792 Ulrich : "A system and method for *discrete mapping of parity blocks in a computer storage system* that includes a plurality of disk drives for storing parity groups. Each parity group includes storage blocks. The storage blocks include one or more data blocks and a parity block that is associated with the one or more data blocks. Each of the storage blocks is stored on a separate disk drive such that no two storage blocks from a given parity set reside on the same disk drive. *File system metadata includes information to describe the data blocks in one or more parity groups.*" Ulrich also has US 6754773 (data engine metadata processor).

6757862 Marianetti : "Claim2. ...*with the data block arranged as an array having rows and columns* with each row comprising one data unit, a first portion of the error correction code corresponds to *row parity values of the array and a second portion of the error correction code corresponds to column parity values of the array.*"

6477632 Kikuchi : "to access *a memory cell array (1), an address translation table* which stores a correspondence between logical and physical addresses, *and an empty block table which specifies locations of*

empty blocks, are stored in an arbitrary block of the memory cell array (1) itself. In the case of reading data from the memory cell array (1), a physical address to read data is attained with reference to the address translation table stored in the memory cell array (1)."

6075545 DeBonet : "storing, accessing, and processing information representing images through the use of *row and column pointers* are described. ...FIG. 1A illustrates an 8.times.8 *grid 12 which represents a block of physical image memory 10.*"

5737623 Liebrock : "Claim1. A computer-implemented method of *automating data layout for parallelization of composite grid problems*, based on problem topology and machine topology, having physical quantities using a parallel machine having parallel processors, comprising the steps of: (a) classifying the physical quantities into one of all small meshes each to be executed substantially by one of the parallel processors, all medium meshes each to be executed by a subset of the parallel processors, or a combination of at least two of large, medium, and small meshes, the large mesh being executed substantially across all of the parallel processors; (b) generating a data distribution responsive to a combination of at least two of the meshes as classified in step (a) and the problem and machine topology; and (c) executing an application program using the data distribution generated in step (b)."

5657439 Jones : "Claim1. In a storage subsystem comprising a *plurality of arrays* of storage devices including at least first and second arrays having a same *number of rows*, said first array configured to include a first *plurality n of blocks of data, a parity block and a spare region per row,* and said second array configured to include a second plurality m of blocks of data per row stored therein, where m may be unequal to n, a method for restoring lost ones of said blocks of data in an event of a device failure in one of said arrays"

5651133 Burkes : "Claim2. ...*providing a hot spare* option where a quantity of the RAID-level virtual storage space is reserved for *disk sparing space*; detecting whether the user has activated the hot spare option; and *in the event the hot spare option is activated, computing* the total virtual capacity of the application-level virtual storage space..."

5488701 Brady : "Claim1. In a log structured array (LSA) comprising a plurality of storage devices configured in a plurality of segments, wherein a plurality of *parity groups* are distributed to some of said segments, *each parity group comprising a plurality of data block and a parity block, and wherein others of said segments are free*, a method for restoring lost ones

of said blocks, comprising the steps of: detecting a failure in one of said plurality of storage devices; copying a free segment table to a temporary storage to preserve the state of said free segment table at the time of said failure; testing each segment in said array against said copy of said *free segment table, to determine if said segment stores a parity group; determining whether a lost segment column in said parity group is a data block or a parity block;* generating a reconstructed data block, if said lost column is determined to be a data block; generating a new parity block from data blocks in said parity group; and storing said reconstructed data block and said new parity block in free segments in said array."

5351246 Blaum : "It is still another object to devise a method and means (1) to permit degraded mode operation even in the presence of more than one DASD failure and (2) devise a method of *simple parity group coding and data rebuilding on a spare DASD that returns the DASD array to fault tolerance.* It is yet another object to devise a method and means to (3) use simple parity coding and XOR operations thereby avoiding multiplications over finite fields as found in standard Reed-Solomon codes, (4) execute only XOR parity coding over the block rather than convolutional type coding..."

20040215603 Sonkin : "*a storage view component which accesses the data storage* component to perform sequential de-serialization *of column data,* a sort view component which maintains *a pointer to the storage* view component enabling subsequent *physical row access to the data storage* component, *a grid storage component* which acquires the de-serialized query results and provides *application-specific formatting,* and a grid control component which supplies output data to the a display."

20040153479 Mikesell : "The forward allocator module may also include an allocation scheme for parity or other error or loss correction protection. In most RAID systems, when file striping is used, parity protection is also used such that all of the disks, except one, are used for data storage. *This parity information is typically calculated by taking a bitwise exclusive or ("XOR") of each block of data across all of the data disks.* This parity information is used to perform data recovery when a disk failure occurs. The lost data is recalculated from taking the bitwise XOR of the remaining disks' data blocks

and the parity information. In typical RAID systems, the data is unrecoverable until a replacement disk is inserted into the array to rebuild the lost data."

20040133607 Miloushev : "Claim1. A method for determining *storage locations* of a user file in a group of file servers in a computer network, comprising the steps of: determining a set of file servers from the group of

file servers for storing the user file; *creating a metafile storing information* identifying the set of file servers for storing the user file; and updating directory structures on the set of file servers to indicate storage of the user file."

20040123296 Challenger : "Claim1. A computer system for processing client requests, said system comprising: *a grid services scheduler connected to a plurality of grid container arrays, wherein each grid container array comprises: a plurality of persistent containers, each container residing in a computer host;* and one micro scheduler in one of said containers; wherein each of said containers includes a plurality of objects, wherein objects within containers that make up a grid container array comprise a grid object array, wherein said grid services scheduler divides a client request into a plurality of tasks and assigns groups of said tasks to each micro scheduler, and wherein each of said microschedulers assigns individual tasks from a group of tasks received from said grid services scheduler to objects within a corresponding grid object array."

20040010503 Williams : "Claim1. A computer database, having a data storage space architecture *comprising a grid having grid lines, intersections of the grid lines forming nodes which provide space for storing data,* each node being one of the permanent type node whose storage space structure is permanent, and a variable type node whose storage space structure is capable of changing in response to an event."

20020103889 Markson : "[0071] In block 146, the process sends one or more messages to a hardware abstraction layer that *forms part of computing grid 132.*"

20020062422 Butterworth : "1. A method for rebuilding *meta-data in a storage system having storage devices in which segments of data are located*, wherein data is written in segments to the storage devices from a plurality of flows of data and each segment of data also contains *meta-data relating to that segment*; the method comprising: scanning the meta-data in each segment to identify the last segment written from each flow; rebuilding the meta-data in the storage system using the meta-data in the segments excluding the meta-

data for the segments identified as being the last segments written from each flow."

20020194526 Ulrich : "...*five metadata structures* and connections between them. Each of these structures, the data they hold, and how the structures are used are described in greater detail below... [0187] A Gee Table 320 holds data about the physical locations of the file blocks on the disk array

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140. The Gee Table 320 additionally *includes pointers to each associated G-node in the G-node Table 330, and each G-node in the G-node Table 330 includes a pointer to an associated portion of the Gee Table 320."*

20020032832 Dykes : "This invention relates generally to optimizing operating parameters of electronic devices, and more particularly to optimizing register settings *of disc drives for optimal performance*...[0013] The function of each register can be represented by an algebraic function. In non-linear situations, the algebraic functions can interact as functions of functions, or powers of one of the functions. In the non-linear situations, the performance of the electronic device can be analyzed by *picking portions or grids* of the function ranges, and estimating or attempting to determine local minima or maxima within each portion." Seagate/asn.

During the course of this search I also uncovered these 2 foreign references.

TW0400476B:
MEMORY DEVICE AND METHOD FOR STORAGE AND ACCESS
Inventor: KIKUCHI, SHUICHI; Japan
Assignee: TOKYO ELECTRON LIMITED Japan
Published / Filed: 2000-08-01 / 1998-12-03
Application Number: TW1998087120109
IPC Code: G06F 12/02; G11C 7/00;
Priority Number: 1997-12-05 JP1997000335596
Abstract: This invention can block erasing memory devices, which provide small capacity and low power consumption. The solution is that in order to access the *mapping relation between the logical addresses and the physical addresses of the memory grid array 1, the address change table with the corresponding relation and the block table with the empty blocks are memorized in the random blocks of the memory grid array.* The physical address is found and its data is read with reference to the address change table during reading data in the memory grid array 1. Additionally, whenever a

data is written, the empty block is determined from the empty block table stored in the memory grid array;, and is written with the data. Furthermore, the updated address change table and the empty block table are written into the empty block table.

WO03038628A1:
APPARATUS AND METHOD FOR A DISTRIBUTED RAID 64 pages
Inventor: PELEG, Nir; 24 Ha'anafa Street, 70300 Beer Yaccov, Israel
Assignee: EXANET CO., 15th Floor, 410 Park Avenue, NY 10222
Published / Filed: 2003-05-08 / 2002-10-29
Application Number: WO2002US0031604

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STL11420

IPC Code: G06F 12/16;
Priority Number: 2001-10-31 US2001000984850
Abstract: *A network RAID controller* 230 that includes a embedded microcontroller 305 having a plurality of operating instructions, a multiport memory 330 connected to the microcontroller, and a plurality of FIFO devices 340-1, 340-2, 340-n connected to the multiport memory which interfaces with a network 220. *The RAID controller further comprises a map memory* 350 connected to the microcontroller which *stores address maps and further includes an exclusive OR XOR parity generator engine 360.*
Attorney, Agent or Firm: MEXIC, Darryl ; Sughrue Mion, PLLC, 2100 Pennsylvania Ave., N.W., Suite 800, Washington, DC 20037-3213 US
Claim 1..A network RAID controller comprising: a microcontroller having a plurality of operation instructions; a multi-port memory connected to said microcontroller; at least one FIFO device connected to said multi-port memory, said at least one FIFO device capable of interfacing with a network; and a map memory connected to said microcontroller, said map memory storing address maps.

EXPRESS MAIL RECEIPT NO. ED639816547US
DEPOSITED ON APRIL 12, 2005

PATENT
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	**Clyde E. Lubbers and Randy L. Roberson**		
Assignee:	**SEAGATE TECHNOLOGY LLC**		
Application No.:	**10/817,264**	Group No.:	**2114**
Filed:	**April 2, 2004**	Examiner:	**Unknown**

For: **STORAGE MEDIA DATA STRUCTURE SYSTEM AND METHOD**

Mail Stop Petition
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

DETAILED DISCUSSION OF THE REFERENCES IN SUPPORT OF PETITION TO MAKE SPECIAL FOR NEW APPLICATION UNDER M.P.E.P. § 708.02, VIII

Sir:

The embodiments of the present invention as claimed by the independent claims are characterized, at least without limitation, by the following recited features:

Claims 1, 16, 18

an array of equal capacity data storage units...allocating each of the data storage units for entirely storing either user data or fault tolerance data....
(excerpts of claims 1 and 18)

an array of equal capacity data storage units...wherein each data storage unit is individually allocated for entirely storing either user data or fault tolerance data....
(excerpt of claim 16)

Claim 21

an array of equal capacity data storage units...a pointer that when multiplied by a storage capacity of said data storage blocks and by the number of rows of data storage units allocated for storing user data, and to which an offset, if any, is added, produces the base address in each storage domain....
(excerpt of claim 21)

Claim 25

an array of equal capacity data storage units...to determine a row such that the row number minus one is multiplied by a capacity of said storage blocks and added to a base address to produce a physical address....
(excerpt of claim 25)

None of the references of record teach or suggest the claimed apparatus whereby a distributed storage system is configured with constant-sized data storage units made from a plurality of domains against sets of a plurality of constant-sized data storage blocks from each of the domains. The fixed-size data storage units are preliminarily allocated for use in entirely storing either user data or fault tolerance data. The allocations can be changed for different storage formats, either by reallocating the existing data storage units in an array in some cases or by allocating additional like data storage units in another array. By placing all the data storage units for user data together in the array, the base address of any data storage unit is addressable as a multiple of the size of the data storage blocks.

U.S. Pat. 5,657,439 to Jones discloses distributed sparing of data storage blocks between two arrays. However, as shown in all the illustrate arrays, Jones is silent regarding defining an array with two or more data storage blocks defining a data storage unit, and allocating each of the data storage units entirely for storing either user data or fault tolerance data.

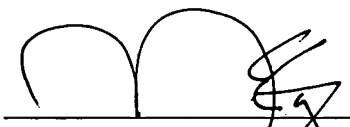
U.S. Pat. 6,775,792 to Ulrich discloses discrete mapping of parity blocks in an array. However, like Jones, Ulrich is silent regarding allocating fixed-size data storage units before storing data. Particularly, Ulrich contemplates randomly sized and positioned storage blocks on an as-needed basis for data storage. See, for example: "The determination of the data block size, number, and distribution is calculated by the file system as data storage requests are received from the clients 110...the block size used for data storage is variable from one block to the next within the file." (Ulrich '792, col. 46, lines 12-20)

None of the references of record disclose or suggest the novelty of the embodiments of the present invention as recited by the language of the independent claims. Furthermore, there is no motivation from the references to modify and/or combine one or more references

to arrive at the embodiments of the present invention as claimed. Accordingly, the references of record cannot sustain a Section 102 or 103 rejection.

It is submitted that all of the elements set forth in M.P.E.P. §708.02 subsection VIII have now been provided in this petition to make special. It is requested that this petition be granted and that the presented claims be examined as soon as possible.

Respectfully submitted,

By: 

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